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The Entomobryiform Male Genital Plate

By KENNETH CHRISTIANSEN

It has been long known that the males of most species of Collembola bear a specialized genital plate surrounding the gonopore. In some groups, such as the Isotomidae and Hypogastruridae, this structure has been useful in making taxonomic distinctions while in the Entomobryidae and related families this organ has been largely ignored. The reasons for this are many but are primarily concerned with the difficulties of examination of this organ in the entomobryids where the whole body is densely covered with large setae and/or scales. In addition to this the organ itself is often extremely small and so complicated that it is difficult to puzzle out its exact structure. These facts, combined with the scarcity of adult males in many entomobryids, have resulted in almost total ignorance of the organ in this group. This is extremely unfortunate for several reasons. First the structure of this organ in entomobryiform collembola is more varied than in any other group. Second, the structure of this organ is extremely valuable in the taxonomy of many forms. This partial survey of the structure of this organ is made in the hope that it will call attention to its possible taxonomic uses and facilitate future work upon it.

Typically the genital plate consists of a slightly domed oval to kidney-shaped flap of integument bearing the gonopore somewhere within it. The most striking characteristics of the structure are the numbers and types of setae borne on its surface. The commonest situation is for a large number of acuminate, smooth setae to be scattered more or less uniformly over most of the surface of the organ. This type of genital plate, which I have named the *multi-setaceous*, occurs in many entomobryiform groups (see Figure 1A). In the entomobryids the plate is unusual in that it normally forms a high dome. In addition some genera such as *Tomocerus* have several types of setae involved; in a few cases both smooth and fringed types occur. Quite commonly the setae vary in size with the smallest ones usually nearest the gonopore.

A second type of genital plate is found in the entomobryids in which the setae are normally smooth and acuminate, but instead of a dense covering only a single row of setae occurs as a ring surrounding the gonopore. This type, which I have called the *circinate*, often has a contraction or shoulder (see Figure 1B) along the line of the setae. The bases of the setae may describe a clear circle, as they do in *Lepidocyrtinus*, or they may be very irregular in position,

so that no clear pattern can be seen, as occurs in the genus *Orchesella*. This situation will obviously lead to intergradation between the circinate and multisetaceous types, and this does occur in one genus, *Heteromuris*, where there are two concentric circlets of setae around the gonopore. In addition to these setae there are in most genera two to six much smaller setae situated near the margin of the gonopore. (See Figures 1B and 1C.) In many cases these are so small that they are readily overlooked.

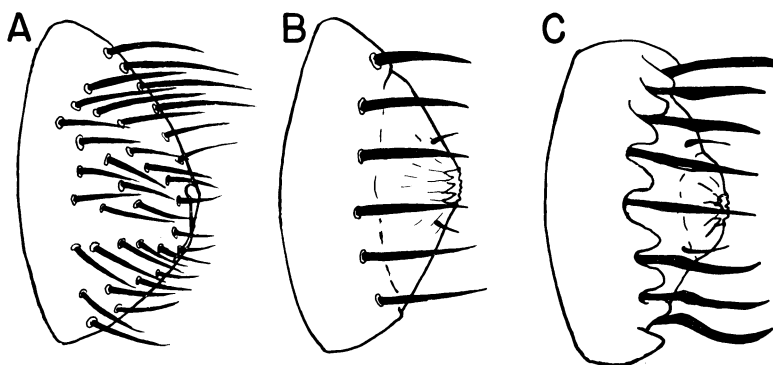


FIGURE 1

Semi-diagrammatic representations of the genital plate types found in entomobryomorph collembola. A, Multisetaceous type; B, Circinate type; C, Papillate type.

The last type of genital plate is quite different from that found in any other group of collembola. This type, which I have called the *papillate*, has a single circlet of setae but these arise between well-developed papillae. Both the papillae and setae are borne on an arcuate ridge of tissue which clearly separates the genital plate into an inner and outer portion. The setae borne on this ridge are generally not normal body size. (See Figure 1C.) They vary in shape a great deal, and frequently the shapes achieved are highly unusual and varied. Sigmoidly curved acuminate forms are quite common, but flat strap-shaped, spoon-shaped, clubbed, truncate, excavate, oval, and triangular forms also occur. Normally the genital plate structure is sufficiently unique in these groups to serve as a sole species criterion. In addition to these setae the four to six very small, acuminate setae seen in the last group occur in the vicinity of the gonopore. An interesting intermediate between the *papillate* and *circinate* types occurs in the genus *Troglopedetes*, where the setae are generally normal, acuminate setae, and although they arise from a definite ridge, the papillae are extremely weak. In all of the species of this genus examined, the setae are of two sizes, and in one species the larger setae are fringed. In some members of the genus *Ento-*

mobrya the whole genital plate appears to be overgrown by two flaps of tissue which serve as covering.

In most forms having the *papillate* type of genital plate two or more different types of setae occur. Most commonly the posterior-most or basal pair of setae are differentiated from the remainder (see Figure 1C), although the lateral two setae on either side may also be differentiated.

In addition to the structures so far described the nature of the gonopore varies somewhat. In most forms it appears to be surrounded by an area of very flexible integument which shows some sign of wrinkling, presumably through the action of a sphincter of some sort. This type of pore then presents an irregular opening of variable diameter and shape. In a few genera (for example *Lepidocyrtus* and *Pseudosinella*) the gonopore is more regular and consists of a longitudinal, key-hole shaped slit. This form of gonopore is found most generally in *multisetaceous* genital plates, and in such cases the gonopore is generally near the posterior margin of the organ.

Although there are some cases of intergradation between some of types of genital plates described above, the huge majority of forms examined can be readily classified into one of the three categories. The chart below summarizes the distribution of the genera examined for this characteristic. The number in parentheses beside each genus name indicates the number of species examined. In no case were two species of the same genus found to have different types of genital plate.

Multisetaceous

Tomocerus (3)
Lepidocyrtus (3)
Pseudosinella (1)
Troglosinella (2)

Circinate

Cyphoderus (2)
Cyphoda (1)
Lepidocyrtinus (1)
Orchesella (2)
Seira (1)
Drepanocyrtus (1)

Papillate

Entomobrya (50)
Drepanura (8)
Parasinella (2)
Mesentotoma (2)
Entomobryoides (4)
Willowsia (2)
Paronella (1)
Salina (1)
Troglopedetes (3)

Heteromuris (1)

In closing I would like to point out that the evidence of the genital plate must be taken into consideration in establishing any scheme of suprageneric classification among the entomobryomorph collembola, and that this evidence is in several cases startlingly at variance with accepted classifications.

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